NEW TRANSVERSE LOW ABDOMINAL INCISION*

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THE incision to be described, when compared with the vertical incisions, presents several advantages: a better exposure with lighter anesthesia, a more comfortable convalescence, a greater strength of the wound, and, incidentally, a fine scar.

It is a modification of the Maylard or Bardenheuer incision, which, in turn, is an outgrowth of the approach devised by Pfannenstiel. The disadvantage of Pfannenstiel's incision is the rather limited exposure it affords; it is, therefore, not practicable in obese patients, nor is it suitable for the removal of large tumors or for any work deep in the pelvis.

The Maylard or Bardenheuer incision differs from the Pfannenstiel incision in that all the layers of the abdominal wall—from the skin to the peritoneum—are divided in the same transverse plane. Although it provides magnificent exposure, it has failed to gain favor in this country; its lack of popularity may well be due to the unwillingness of the surgeons to section both rectus muscles, in spite of the fact that the incidence of postoperative hernia following this incision compares very favorably with the end-results of the customary vertical incisions.

The modification to be described overcomes this objection, and combines the attractive features of both the Pfannenstiel and the Maylard-Bardenheuer incisions.

DESCRIPTION

The incision through the skin is made like its prototype—a curvilinear incision, beginning from one to two fingerbreadths below and medial to the anterosuperior iliac spine, crossing the midline, running almost straight and just within the upper pubic hair line, and terminating below the iliac spine of the opposite side (Fig. 1, *A*). It is developed through the subcutaneous tissue down to the aponeurosis of the external oblique muscle and the anterior sheath of the recti. The vascularity is variable, sometimes only a few vessels require ligation; generally, however, more clamping and ligating is necessary than with a vertical incision. At either end of the incision the superficial epigastric vein is usually encountered, divided, and ligated.

The anterior sheath of the rectus muscle is nicked on either side of the midline; it is then divided transversely with scissors, and the incision is extended laterally through the aponeuroses of the external and internal oblique muscles, thus exposing the underlying recti in the center, and the fascia transversalis and the peritoneum laterally. In the more central portion the aponeuroses of the oblique muscles are fused; but, as the incision is extended laterally, two separate layers will be recognized. The fleshy fibers of the internal oblique muscle come into view about two fingerbreadths from the anterosuperior iliac spine where the incision ends. In exceptional cases the muscle may be encountered farther medially, and since the direction of its fibers is the same as that of the incision they may be split bluntly. The lower flap of the rectus sheath is grasped on either side of the midline and separated by gauze dissection from the underlying rectus muscles as far as the pubic bones. In the midline a fibrous septum (part of the linea alba) extends from the deep aspect of the sheath between the contiguous margins of the two recti (Fig. 1, *B*.) This septum must be snipped with scissors, with care to remain deep to the aponeurosis to avoid button-holing that structure; the penalty of a slit in the sheath is a possible postoperative hernia. The pyramidalis muscles are next dissected from the recti.

Near their attachment to the pubis, the recti are fibrous, frequently entirely tendinous (Fig. 2a). They are cut at their very insertion into the pubis. Even in rare cases in which the muscle fibers are abundant, bleeding is negligible. The muscles are then reflected upward.

The peritoneal cavity is first entered at either end of the incision, under the lower flap of the rectus sheath. By the insertion of the index finger into the peritoneal cavity, the height of the bladder is ascertained, and the peritoneum is incised transversely about one fingerbreadth above the line of its reflection from the abdominal wall to the bladder. In the midline the urachus is divided, and the rare instances of its patency should be kept in mind. The incision, extending from one inferior epigastric artery to the other, is usually sufficient, but there is no contraindication to dividing one or both arteries.

In the closure of the incision the peritoneum is sutured in the customary fashion. The pyramidalis muscles are allowed to fall on top of the peritoneum without any sutures, or their apex may be sutured by a single stitch to the deep aspect of the recti. The ends of the rectus tendons are securely united with mattress sutures to the under surface of the rectus sheath (Fig. 2b). Even in the cases in which muscle fibers predominate at the end of the recti, a preponderance of fibrous tissue will be found in the midline and along both lateral margins. After the insertion of the midline suture the lateral edge of each rectus muscle is sutured as far laterally as possible, encroaching on the Hesselbach's triangle.

In the earlier cases an apparently more rational procedure was employed: the rectus tendons were not detached from the pubis, but a stump was left for subsequent reattachment. However, it was discovered that the sutures had a tendency to pull out of the distal-cut end of the tendons.

Reattachment of the recti is the only part of the closure which may prove slightly difficult. However, the table may be broken so as to flex the patient's pelvis on the trunk, thus approximating the structures to be sutured. If the operation is performed under general anesthesia, the latter, hitherto very light, must be deepened at this stage; the rectus muscles have retracted, and must be relaxed

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to permit their reattachment without undue tension. It will be remembered that the recti are firmly attached to their anterior sheath; consequently, if the edges of the upper flap of the rectus sheath are grasped and pulled down, suturing of the lower end of the muscles will be greatly facilitated.

The aponeuroses of the oblique muscles are then closed in a single layer, care being taken to pick up both layers in the lateral portions of the wound. Superficial fascia and skin are sutured in the usual way.

ADVANTAGES

This incision offers several definite advantages.

The transverse diameter of the lower abdomen is about 25 per cent longer than the distance from the umbilicus to the symphysis pubis in the male and even longer in the female. Since the resultant exposure is proportional to the square of the axis, the transverse incision is capable of giving an operative field from one and one-half to two times larger than that afforded by the vertical incision. An additional advantage lies in having the center rather than the end of the incision over the operative field. Inasmuch as the overhanging fold of fat found in very obese patients is above the level of the transverse incision, it will not be in the way of the sur-

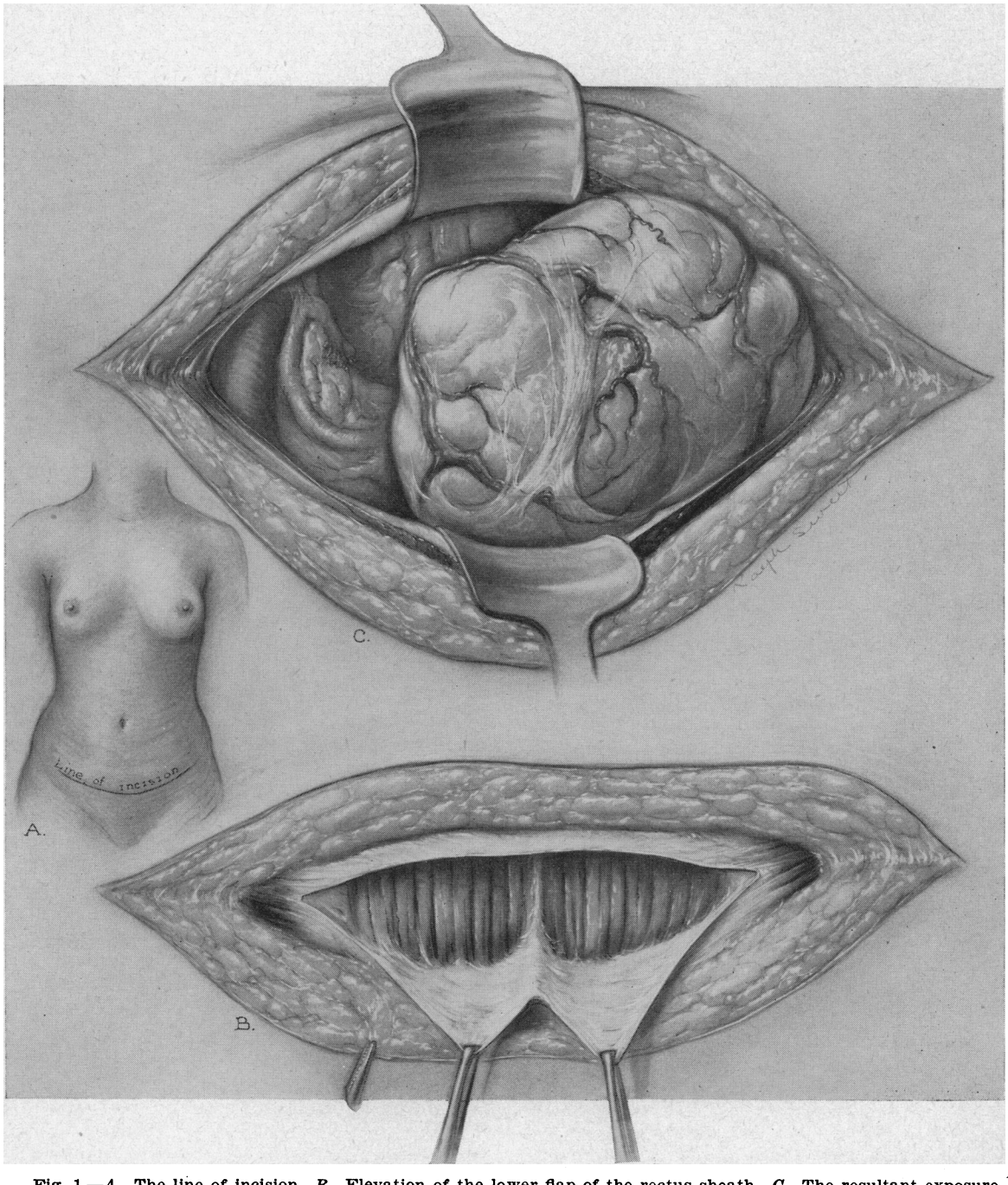

Fig. 1.—*A*. The line of incision. *B*. Elevation of the lower flap of the rectus sheath. *C*. The resultant exposure. The particular tumor was a large ovarian cyst, intraligamentous, filling the entire true pelvis and projecting into the false pelvis.

geon, thus appreciably decreasing the depth of the wound.

The exposure gives ready access to the lower sigmoid and the upper rectum, the region of the bifurcation of the aorta and the organs contained in the broad ligament (Fig. 1, *C*). Even in the male, the rectum can be mobilized as far as the end of the coccyx, under direct vision and without the handicap of working in a deep funnel. Surgeons who favor the preservation of the anal sphincter, as in the Devine procedure for excision of carcinoma at the rectosigmoid junction, will be able to remove more of the rectum, and to achieve an anastomosis deeper in the pelvis than can be accomplished with the use of the vertical incision.

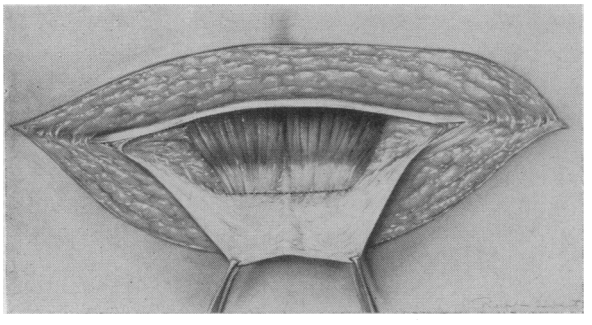

Fig. 2a.—The lower flap of the rectus sheath, elevated to expose the tendinous ends of the recti. The dotted line indicates where they are to be divided. Note the fibers of the internal oblique muscle showing at either end of the incision in the fused aponeurosis of the oblique abdominal muscles.

The incision described is not intended for general exploration of the abdominal cavity, but it will permit palpation of the liver and the performance, if desired, of the incidental appendectomy, unless the appendix is located unusually high. I have heard from other surgeons that large pelvic tumors extending to the level of the umbilicus have been delivered through this incision without difficulty.

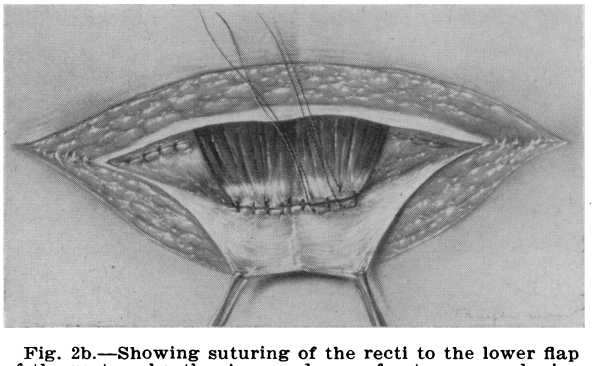

Fig. 2b.—Showing suturing of the recti to the lower flap of the rectus sheath. A second row of sutures may be inserted if desired.

The strength of the abdominal wall following this approach results from four factors: (1) no part of the muscle is denervated—the pyramidalis is of little account; (2) the aponeuroses of the oblique abdominal muscles, the recti muscles, and the peritoneum are divided at different levels—in a staggered incision, the layers of the abdominal wall are not weakened in the same place; (3) all the sutures are taken in tendinous structures which offer more secure anchorage and more reliable union; and (4) the direction of the pull of the oblique abdominal muscles is parallel to the direction of the incision in their aponeurosis. Consequently, the line of suture in this most important layer of the anterior abdominal wall is subjected neither to the constant strain of muscle pull, nor to the sudden disrupting jerk during a paroxysm of coughing. The incidence of evisceration or postoperative hernia should be negligible.

A question might arise as to why a powerful muscle like the rectus abdominis does not tear loose from its suture line once the patient begins to use it. The answer lies in the fact that the recti muscles become reattached to their sheath, not by the cut end, but by their entire anterior surface. In addition, since the recti are segmented, the greater part of the muscle pull is communicated to the anterior rectus sheath through the interscriptions; thus, the newly established union between the rectus muscles and their sheath will be subjected to the strain of the pull of only about the lower fifth of each rectus muscle.

The low abdominal incision is also attractive from the point of view of anesthesia. As the incision is below the level of the eleventh segment of the thoracic cord, spinal anesthesia need not extend higher; accordingly, there is less depression of the blood pressure. If general anesthesia is employed, it may be light, except when the rectus muscles are being reattached; no muscular relaxation is required at other times because the contraction of the muscles does not tend to close the wound. The edges of the wound gape without the aid of retractors. Very little packing is required to keep the small intestines out of the field, and for this reason there is less tendency to postoperative distention. The possibility of performing a cesarean section with minimal anesthesia makes for greater safety for the infant.

The lower abdomen is not used much in respiration even by men; consequently, the pain of a low abdominal incision is not aggravated by breathing and will have almost no inhibiting influence on respiration. Since the incision is relatively painless, the requirement of narcotics is diminished; a pillow placed under the patient's knees for the first two days will further reduce postoperative discomfort. No adhesive strapping is needed above the iliac crest, thus further promoting better pulmonary ventilation. The surprising freedom with which the patient moves in bed after operation can be easily explained by the consideration of the anatomical factors involved: the patient turns by the use of the oblique abdominal muscles; since they do not tend to pull the incision apart, their contraction does not produce pain. These same muscles are the ones primarily concerned in coughing; therefore, the patient has less dread of expectorating. The combination of relatively painless motion, respiration, and coughing leads one to expect a very low occurrence of pulmonary complications.

For those patients who judge the merits of an operation by the appearance of the scar, this incision is particularly desirable; the part which is not hidden by the pubic hair follows the natural skin lines and will eventually merge with these lines.

I have information concerning approximately one hundred of these operations that have been performed by surgeons in different parts of the country, and the results have been eminently satisfactory.

The question of how calamitous infection would be has naturally been raised. To my knowledge, there have been three infections to date; they were all limited to the subcutaneous fat, and cleared up promptly. In view of greater vascularity of this region, one may expect a lower incidence of infection here than in other locations in the abdomen.

Until we gain more information from inadvertent infections, the use of this incision is not advocated for patients in whom infection would be a likely complication. In abdominoperineal resections and other pelvic procedures with potential contamination of the wound, local use of sulfanilamide in the properitoneal, and particularly in the subcutaneous fat, is advisable.

SUMMARY

A new transverse low abdominal incision is described which has advantages in all the stages of the operative treatment. During the operation, it affords better exposure with lighter anesthesia. During the early postoperative days, it makes for greater comfort by decreasing abdominal distention and decreasing pain on deep respiration, coughing, sneezing, and moving; the incidence of pulmonary complications is, consequently, less. Ultimately, as well as immediately, the wound is strong because no muscle is denervated, the incision is staggered, all the sutures are taken in aponeurosis or tendon, and the direction of the main muscle pull is parallel to the direction of the incision; these factors should practically eliminate dehiscence of the wound in the early days, or development of a postoperative hernia subsequently. The good cosmetic result appeals to the patient as much as the other features do to the surgeon.

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TROPICAL DISEASES*

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ONE of the finest chapters in the history of the United States Naval Medical Corps is being written today by the extraordinarily competent handling of the tropical disease situation by the men in the advanced units. The hospitals on the West Coast are greatly indebted to these men for their brilliant and sometimes inspired clinical reports.

MALARIA

Malaria is, of course, numerically our greatest problem, and its therapy continues to be not entirely satisfactory. A new departure in therapy first used by Lieutenant Kennedy at the Letterman Hospital is very promising. We have used several forms and combinations of therapy. The form that to date has given us the smallest number of recurrences is a combination of larger doses of atabrine, standard doses of quinine combined with the use of adrenalin and ephedrine. Our use of intramuscular doses of atabrine to secure an initial high blood level and maintenance of that level by continued oral use is insufficient, both as to number and length of time, to permit any conclusion. The intravenous route for quinine administration has achieved brilliant results for us in cerebral, and some of the other atypical malarias seen in our hospital. In our experience 90 per cent of the cases have been benign tertian, 6 per cent malignant tertian.

The clinical manifestations and immunological reactions have given some indication that the benign tertian being seen today may be a separate type from the usual strain that has been seen. Further work is now being done by Dr. Paul Michael on this problem. We have one case, a man who had been on Samoa only. This is the only case reported from this area.

INTESTINAL PARASITISM

Intestinal parasitism, though showing a high total number of cases, is not alarming when considered on a census percentage basis; as a matter of fact being almost within the same percentage limits as seen in this country. The slide shows the percentage observed to date in our hospital. Fourteen per cent of examined stools showed pathogenic forms. They have not been a serious problem.

PARAGONIMIASIS

Paragonimiasis, a rather unusual disease, was detected in our armed forces by Dr. John J. Miller, Jr. This disease has also been known as pulmonary distomiasis and endemic hemoptysis. Both of these names are open to criticism as being misleading. The infection may be found in any organ of the body, is not necessarily characterized by pulmonary involvement, and hemoptysis need not be present, though the lungs are involved. It is seen commonly in Japan, Korea, Formosa and in many isolated Far Eastern foci, including the Philippines and, with the advent of this war, Samoa.

Ova are expectorated or passed in the feces of infected man or animal, mature and hatch in water, liberating a miricidium. This penetrates the soft parts of a snail, develops into a cercaria, or the second generation form. These cercaria penetrate the chitin of the crayfish, cause a generalized infection and become encysted. These encysted forms, if eaten by man, either raw or improperly cooked, penetrate the intestinal wall, migrate through the diaphragm to the lungs, and from there to any part of the body. Some of the young worms may not penetrate the diaphragm. They have been found fully grown in the peritoneal cavity. Direct infec-

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The opinions or assertions contained therein are the private ones of the writer and are not to be construed as official or reflecting the views of the Navy Department or the Naval Service at large.